Remarks

Reconsideration of this application, as amended, is respectfully requested.

Claim 56 has been amended to recite an ALD apparatus having a reaction chamber coupled between a first gas flow pathway and a second gas flow pathway. The first gas flow pathway is coupled upstream of the reaction chamber and has switchable first and second flow limiting conductances. The second gas flow pathway is coupled downstream of the reaction chamber and is characterized by a downstream flow limiting conductance switchable under the control of a control system configured to operate the downstream flow limiting conductance to maintain a nominally constant ratio of a conductance of the first gas flow pathway to a conductance of the second gas flow pathway under varying gas flow conditions. Support for the amendments to claim 56 is found in the specification as originally filed, for example in Figures 4-7 and paragraphs 46, 48-54, 56, 63, 69, 70, 73 and 75.

As amended, claim 56 recites structural features of an ALD apparatus which patentably distinguish that apparatus over the references cited in the Office Action. The structural nature of these characteristics is evident from the language of the claim. For example, structural definition of the location of the reaction chamber between upstream and downstream gas flow pathways is recited. So too is the nature of the first gas flow pathway, which includes switchable first and second flow limiting conductances. Examples of such conductances are recited in the specification, for example fast switching pneumatic valves described in paragraph 51. Of course, other switchable conductances may also be used.

The second gas flow pathway is also defined by structural characteristics, notably the downstream flow limiting conductance that is switchable under the control of a control system. An example of such a downstream flow limiting conductance is the dowstream throttle valve and its open or closed loop control system, as discussed in paragraph 46 of the specification.

The nature of the control system itself is also recited in claim 56, namely that it is configured to operate the downstream flow limiting conductance to maintain a nominally constant ratio of a conductance of the first gas flow pathway to a conductance of the second gas flow pathway under varying gas flow conditions. This is discussed, for example, in paragraphs 48 and 63-69 of the specification. This particular configuration of the control system distinguishes it from a general purpose control system and thereby renders definiteness and structure to this element. Stated differently, the language defines what the control system is,

rather than just what it does.

Previously, the Examiner has characterized similar structural limitations in the claims are mere "intended uses" and has declined to accord them patentable weight, relying on *In re Walter*, 618 F.2d 758 (CCPA 1980). But such reliance is inapposite. At issue in *Walter* was the question of whether or not claims directed to a mathematical algorithm were directed to statutory subject matter under 35 USC 101. The claims at issue included in the preamble a recitation of the environment in which the purported improvement discussed in the remainder of the claim operated -- i.e., the intended field of use. Under these circumstances, the court found little difficultly in concluding that the claim was not directed to statutory subject matter. However, the claims at bar bear no relation whatsoever to the situation presented by the claims in *Walter*. First, the claims are directed to a statutory apparatus, and no suggestion has been made otherwise. Second, the claims do not recite a mathematical algorithm but instead recite features of an ALD apparatus. Third, the structural limitations recited in the claims are found in the elements thereof, and not in the preamble. In short, the holding in *Walter* is simply inapplicable to the situation presently before the Examiner.[1]

1. The Claims are patentable over Hamilton in view of Shealy.

The Office Action seeks to combine the teachings of Hamilton, US Patent 5,993,555, concerning an eptaxial growth reactor having multiple gas input pathways, with those of Shealy, US Patent 6,217,973, concerning an epitaxial growth reactor with multiple gas outlet pathways, to arrive at the presently claimed ALD apparatus. However, even if one were to make the combination suggested by the Office Action, one would not arrive at the present invention. Notably, the combined teachings would not include a control system configured to operate a downstream flow limiting conductance to maintain a nominally constant ratio of a conductance of a first gas flow pathway to a conductance of a second gas flow pathway under varying gas flow conditions, as recited in claim 56.

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[1] In like vein, neither *In re Casey*, 152 USPQ 235 (CCPA 1967) nor *In re Otto*, 136 USPQ 458 (CCPA 1963) lend support to the Examiner's position. In *Casey*, the issue addressed by the court was whether or not a purportedly new taping machine which had an identical structure to a prior perforating device could be distinguished simply by characterizing the device differently in the preamble. The answer was no. In *Otto*, the court restated the rule announced in *In re Young*, 25 USPQ 69 (CCPA 1935), that inclusion of work piece in a claim to an apparatus does not impart patentability to the apparatus. Neither situation is presented in the instant matter.

As set forth above, the characteristics of the recited control system are more than just statements of intended use. The configuration of the controller is a positive recitation of what it is. One cannot ignore this important structural feature when considering the patentability of the present claims.

Neither Hamilton nor Shealy include any discussion of the nature and relationship of the conductances of the respective upstream and downstream gas flow pathways under varying gas flow conditions that would lead one of ordinary skill in the art to provide an ALD apparatus that includes a control system configured to operate the downstream flow limiting conductance to maintain a nominally constant ratio of a conductance of the first gas flow pathway to a conductance of the second gas flow pathway under varying gas flow conditions, as recited in claim 56. Indeed, there is nothing in either reference which even suggests that such a control system is meaningful. At most, Shealy indicates that the upstream and downstream ports from the reaction chamber should be aligned so as to provide for laminar gas flow within the reactions chamber. Adding such teachings to those of Hamilton would not yield the presently claimed ALD apparatus. Hence, claim 56 and its dependent claims are patentable over this combination of references.

2. The Claims are patentable over Hamilton in view of Shealy and Cox.

Cox, US Patent 6,228,773, is cited for allegedly teaching a processing apparatus having an external plasma source. Even if true, adding such teachings to those of Hamilton and Shealy would not yield the presently claimed invention inasmuch as the recited control system would still be absent. Consequently, the claims are patentable over this combination of references.

3. The Claims are patentable over Hamilton in view of Sakai and Kugimiya.

The patentability of claim 56 over Hamilton is addressed above. Sakai, US Patent 5,070813, discusses a coating apparatus having a downstream iris diaphragm controllable to vary the size of its central opening. However, the controller is not configured to operate that iris diaphragm to maintain a nominally constant ratio of a conductance of a first gas flow pathway to a conductance of a second gas flow pathway under varying gas flow conditions, as recited in claim 56. Indeed, there is nothing in either Hamilton or Sakai that discusses the importance of maintaining such a ratio of conductances.

Kugimiya, US Patent 6277763, is cited for discussing software controllable upstream and downstream conductances that switch operational modes with one another. The apparatus described by Kugimiya does in fact include a computer-based controller that operates under the control of software to control various chambers and subprocessors. The software routine controls an "etch process" but there is no discussion in this reference of controlling such a process to maintain a nominally constant ratio of a conductance of a first gas flow pathway to a conductance of a second gas flow pathway under varying gas flow conditions, as recited in claim 56. Therefore, at best, one of ordinary skill in the art may have adopted Kugimiya's teachings to control pressures and flows of various gasses introduced into a reaction chamber (e.g., as described at col. 5, ll. 6-36 of Kugimiya), but nothing suggests that one would use a controller to maintain the nominally constant ratio of conductances recited in the claim. Hence, adding the teachings of Kugimiya to those of Hamilton and Sakai would not yield the present ALD apparatus.

4. Discussion of Posa and Tanaka.

As noted above, Examiner Zervigon suggested that these references be reviewed in the context of the amendments to claim 56. The following comments are provided to assist Examiner Zervigon in his review of same in connection with the present RCE.

Posa discusses a chemical vapor deposition (CVD) apparatus arranged to provide constant pressure within the reaction chamber. This is done using a gas manifold that has inlet valves for simultaneously switching equal flows of reactive and nonreactive gasses during the CVD process. By maintaining an overall constant flow of the combined nonreactive and reactive gasses, the pressure in the reaction chamber is maintained constant. As gas flows are switched out of the reaction chamber, they are switched into a vent chamber, which is maintained at the same pressure as the reaction chamber. The use of the vent chamber minimizes flow surges during the switching. See Posa at col. 3, ll. 26-48. Posa's CVD apparatus also has a downstream pump that is used to evacuate the reaction chamber. Between the reaction chamber and the pump is a throttle valve. The valve's position is set by a controller, according to the difference between the pressure in the reaction chamber and a reference source. Posa at col. 5, ll. 17-32.

Thus, unlike the presently claimed invention, Posa does not employ a controller configured to operate a downstream conductance (e.g., the throttle valve) to maintain a

nominally constant ratio of a conductance of an upstream gas flow pathway to a conductance of a downstream gas flow pathway under varying gas flow conditions. Instead, Posa controls the throttle valve according to the pressure in the reaction chamber. This is significantly different from the presently claimed invention and so even of the teachings of Posa were combined with those of any of the other references discussed above, one would not arrive at the present invention.

Tanaka describes a CVD system employing exhaust pipes that are distributed radially around the reaction chamber. The exhaust pipes each include a conductance valve and a temperature sensor. The conductance valves are adjusted during exhausting of gas from the reaction chamber to minimize temperature differences between the exhaust pipes. Tanaka at col. 3, ll. 15-44.

Although Tanaka does discuss the use of variable conductances in a downstream gas flow pathway, there is no discussion of a controller configured to operate those downstream conductances to maintain a nominally constant ratio of a conductance of an upstream gas flow pathway to a conductance of a downstream gas flow pathway under varying gas flow conditions. Instead, Tanaka controls the conductances according to temperature variations among the different downstream gas flow pathways. This is significantly different from the presently claimed invention and so even of the teachings of Tanaka were combined with those of any of the other references discussed above, one would not arrive at the present invention.

For at least the foregoing reasons, the claims are patentable over the references cited in the Office Action. If there are any additional fees associated with this communication, please charge Deposit Account No. 19-3140.

Respectfully submitted,
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Date: February 12, 2009

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